FEBRUARY 195

Cost and Management

THE SOCIETY OF INDUSTRIAL & COST ACCOUNTANTS OF CANADA
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Journal of the Society of Industrial and Cost Accountants of Canada

CONTROL

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Editorial Comment . . .

WHAT PRICE LEADERSHIP?

WHAT MAKES A MANAGER? Some pertinent answers to this question were culled by the London Chapter of the Society in a recent questionnaire to a select group of management men who have come up through the ranks. The answers were incorporated into the Chapter's "Students' Night", held recently to clarify goals for the student.

The common denominator in all the answers was the stress on broadening of knowledge. It is not enough to be a crackerjack at the job one is now doing. Proficiency in any specialization is more or less taken for granted, along with the other requisite qualities of honesty, integrity, willingness and conscientiousness. Something more than this is necessary for the man who wants to get into the management group of his company. Indispensable is a wide knowledge of the other factors that enter into management. He will have to be expert in human relations—for management is the art of getting things done through other people. He will have to be versed in economics, to know not only what is going on in his own firm but to recognize trends in the industry of which his firm is a part. He will have to obtain a good general knowledge of the procedures and basic principles underlying all functions of industry, including finance, manufacturing, processes, industrial relations, purchasing, stores, sales and advertising, with particular application to the company with which he is employed. Presuming he gets his start in industrial accounting, he would be well advised to concentrate on the management aspects of accounting such as planning and control.

Working as he does in a limited sphere, how is the would-be manager to acquire this broad general knowledge? If he has an academic background, so much the better. He will have learned the fundamentals, at least, of the social and general sciences, gained a broad and open-minded outlook and developed an inquiring mind. If he has not had the advantages of a formal education, the deficiency can be remedied by night school courses and constant reading, studying and listening. Continuing study of this kind is a must, no matter what qualifications a man has, for the brain that is not broadened soon loses its perspective. Moreover, new branches of knowledge are developing all the time and old ones are undergoing change and moderation. It will pay to keep up with the latest developments, if only in a cursory fashion at first. As the specialist gains experience and increased opportunities to apply what he learns, he will find this knowledge takes on new depth and meaning.

The search for general knowledge must go on simultaneously with the search for improved performance in the specialty which the management student has chosen. If he is an accountant, he must be a good one. He should be thoroughly familiar with accounting principles and practices and their application in his company. He

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must learn to exercise sound accounting knowledge and judgment. He must be able to report and interpret lucidly to management the state of the business from production to sales realization to and through the financial statements of the company. As he achieves these objectives, the gap between accounting and management will be narrowed proportionately.

The means for acquiring technical knowledge are the same as those for acquiring general knowledge. Basic to the accountant is a proper course of studies (the cost accountant will have his R.I.A.) coupled with daily on-the-job experience and observation. Intensive reading, supplemented by attendance at conferences and seminars, will help keep him abreast of the latest developments in his field. The conscientious accountant must be prepared to spend at least one hour daily in reading professional literature or he will soon find himself very much out of date.

So much for the conscious steps an accountant can take to prepare himself for management. The other essentials that will throw him into the limelight of management candidacy are more subtle. First of all he must *want* to be a manager—badly enough to undertake such a long, arduous program of self-improvement. If he can truthfully say he has done and is doing all this then he need not worry about possessing the *energy* and *drive* required of an executive—he undoubtedly has both. Some of the other qualities that mark him as management material, he will probably have cultivated to a large extent on the job and in his studies. No man can be exposed to the stimulus of a steady stream of creative *ideas*, gained from reading and listening, without developing a few of his own. No man can associate closely and constantly with the executive mind (providing he has developed the faculty of observation) without a bit of the *decision*, *imagination* and *initiative* which he sees rubbing off on him. He will have learned how the facts, assembled by himself, are marshalled and weighed and what decisions result from a specific type of situation. He will have learned how management *vision* is given practical expression, something about the pitfalls of organization and what methods of dealing with people are effective. He will learn what type of behaviour brings respect and cooperation from employees or, inversely, what type incurs their animosity. From his own treatment and reactions and those of others, he will learn how to *delegate* authority and what tasks can be delegated.

From his knowledge of other sectors of the business, he will have learned something about the other man's problems and from this knowledge comes mutual *understanding* and *cooperation*. If he has tried to apply what he reads to the conditions and circumstances of his own company, not only will his own outlook and experience be broadened, but in the many practical suggestions and improvements which should result, he will present to management the proof of his knowledge, initiative and capability.

Whatever his native endowments, a man can substantially enhance those qualities he has and, to a certain extent, can acquire others. We can't all be management geniuses, but where there is the desire to succeed and the perseverance to carry it through, a man can raise himself to an acceptable level of management capability.

And what better vantage point for achieving management status than industrial and cost accounting? The cost accountant is in a preferred position to progress into the management group and to carry into that group a basic financial know-how of all phases of the operation. But is he prepared for the job? That will be up to him.

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IDP APPLIED TO MONTHLY CLOSING

By Robert F. Van Loon,
Manager, Statements, Costs and Payables,
Caterpillar Tractor Co.,
Joliet, Illinois.

Mechanization applied to the ledger gave this company earlier closing and more timely reports at a savings in time and money. It also made possible better work scheduling throughout the month and permitted extra time for analyzing transactions as they occurred, an inestimable boon to management decision-making. Here the installation of the system is described in detail.

THE HISTORY of bookkeeping and accounting reveals that the basic accounting concepts used today are much the same as they were decades ago. Yet, modern forward-looking accountants have introduced new methods and techniques which would hardly be recognized under past standards, but still these methods and techniques conform to sound accounting principles. Changes in methods have come about because accountants have recognized the need for more and more information almost as soon as it happens as opposed to being merely financial historians.

Due to a more complex business climate, increased governmental requirements, and increased competition, accountants are being confronted with an ever-increasing demand from all levels of management for varied up-to-date information which will enable them to do a better job.

It was, therefore, our objective in going to a mechanically-prepared ledger and related reports to better meet the needs for accurate and timely information. Needless to say, we have not reached perfection, but we do feel that we have taken a big step in the right direction. With the right amount of planning and thinking being applied, we have no doubts about being able to do a still better job in the area of supplying current information to management.

REASONS WHY PROBLEM HAS CONTINUED TO GROW

Our company is a manufacturer of heavy machinery consisting of diesel crawler tractors, off-the-road wheel tractors, motor graders, earthmoving equipment, diesel industrial engines and replacement parts for these products which are used primarily in the construction, logging, mining, and agricultural industries. Since 1950 it has grown from an operation consisting of two plants, nine emergency parts depots, and one parts department located in the U.S. to the point that there are now eight domestic plants, ten emergency parts depots and four parts warehouses in addition to six foreign subsidiaries located throughout the world. Each plant maintains its own set

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After graduating from the University of Illinois in 1951 with a B.S. Degree in Accounting, the author joined Caterpillar Tractor Co. in Peoria, Illinois in the College Graduate Accounting Training Program. Later that year, he was transferred to the Joliet Plant Cost Accounting Division. In 1952 he became Supervisor of Cost Accounting, transferring to General Accounting in 1955. He is currently Manager, Statements, Costs and Payables.

of accounts, (excluding sales), records monthly transactions, and reports data to the general office staff for the consolidation of corporate financial data and to plant management for better control of operations. The company is essentially a decentralized organization—it then follows that the various plant accounting departments are directly accountable to the plant manager from whom they receive line authority, but have functional responsibility to the controller for following of accounting principles to insure uniformity in accounting throughout the company and meaningful consolidated reports.

JOLIET PLANT OPERATION

The Joliet, Illinois plant manufactures earthmoving equipment (scrapers, bulldozers, cable controls, hydraulic controls, rippers, and agricultural tools), and employs several thousand people. A replacement parts warehousing facility is also located here.

The accounting department is organized on a functional basis with responsibility divided between general accounting, machine accounting, auditing, and office service divisions, reporting to the chief accountant. A standard cost system is used and, as mentioned earlier, a complete set of accounts (with the exception of sales) is maintained.* The standard cost of finished machines (prime products) is transferred each month to the general offices account. Closing of the Joliet plant books and issuance of financial reports required nine working days prior to the installation of the mechanically prepared ledger and trial balance.

IMPROVED COSTING FIRST

In the early period of operation at Joliet, many closing schedules were prepared manually with machine applications being introduced as volume of work increased. Almost from the start, costing of production, spoilage, intra-company transfers, phases of processing vendors' invoices, and other accounting transactions were done mechanically. Due to the requirements of our cost accounting system, several material, labour, and burden accounts are used. The eighty-column tabulating cards did not have sufficient columns for extensions of all these classifications. It was thus necessary, with conventional machines, to extend by the digiting method, i.e., multiplication by addition on a tabulator. In order to meet the closing date established by general offices, two decks of master standard costs were maintained as the required sorting, collating, and digiting was a very slow process. This in turn required different cut-off dates for various documents so that they could be scheduled in our machine accounting unit. Due to holding open through the last working day at year-end, December and January reports then became distorted in comparison to the other months.

Although schedules were prepared and meetings held (we even tried brainstorming sessions out of which came some worthwhile ideas) to improve our closing schedule, it was usually a constant struggle to close the books on time. The all-too-familiar situation of closing at the last minute seemed to be the rule rather than the exception.

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*See the August, 1951, N.A.C.A. Bulletin, "Allocation of Overhead Costs—A Short Cut" by W. H. Franklin, an article dealing with Caterpillar's method of allocating overhead.

With the installation of a medium-size computer in April 1956, a method was developed whereby all transactions affecting inventory, which previously had been cut off at different times prior to the end of the accounting month, could be costed at standard in one operation. This enabled us to "hold open" on all documents through the end of the month and also resulted in considerable savings in time. A program was written making it possible to process all documents, regardless of exceptions in the various types of transactions (scrap, production, transfers, etc.), in one run.

We were still unable to accomplish a faster closing mainly because of the approximately two days involved in manually posting to the ledger, balancing, drawing off the trial balance, and preparing financial statements, although much pressure was taken off the existing schedule and we were able to eliminate distortion of financial data between accounting periods. It was only natural that we began to look for other ways to speed up closing, and from this developed the mechanically-prepared ledger and trial balance.

CONVERTING TO A MECHANICAL SYSTEM

To get a better picture of the transition from the manual to mechanical methods, a description of our manual operation will first be presented followed by a more detailed outline of the mechanical system. It should be pointed out that our present system is not totally mechanical, but for purposes of reference we shall use the terms "manual" and "mechanical" systems.

The accounting month consists of 21 days with the exception of the month during which the plant, for the most part, is shut down for vacation. As mentioned earlier, various source documents were cut off at different times in order to facilitate the closing process. Where possible, documents received through the end of the accounting month were processed as that month's business. During the closing period as listings were received from machine accounting, books of original entry completed, and interplant entries received, journal entries were prepared and manually posted to the general and subsidiary ledgers. After all journal entries were posted, the ledgers were balanced and the trial balance drawn off manually. The financial reports were then prepared, usually on about the ninth working day. Following the completion of the financial reports, a list of all departmental expenses from the journal entries was manually prepared and forwarded to machine accounting where cards were keypunched for the purpose of preparing expense statements. This required another two to three days, resulting in the issuing of cost control reports, such as departmental expense statements, on approximately the twelfth working day.

A study of the manual system quickly showed us that the same information was being hand-written several times before financial and expense statements were completed. We then decided that the principle of integrated data processing could be applied by writing the information just once onto a punched card which could then be used in a number of ways without repeating the process of manual copying. In reviewing our journal entries, we also found that from month to month the same accounts are consistently used within individual journal entries. It was then concluded that once the necessary information from the previous month was punched into the cards, they could be reproduced, the previous month's dollar amount reproduced into

different fields, and used for the following month's journal entries. This would require only the dollar amounts to be entered and the cards sent to machine accounting for keypunching. Blank cards are used for those accounts which did not appear in journal entries the previous month. To date we use approximately 1,000 prepunched (reproduced) cards as compared to 50 handwritten cards (referred to as journal entry detail cards (EXHIBIT A). This gave us the starting point for the mechanically-prepared ledger.

MONTHLY PROCEDURE

As the journal entry detail cards are received from machine accounting, after being reproduced from the previous month's journal entry detail cards, they are distributed to those employees responsible for the preparation of journal entries. Once the basic information required to complete the entry is received, it becomes necessary to write in only the dollars for each account, total the amounts and check the balance to the source information. It is no longer necessary to write the account number and description for both the subsidiary and general accounts on a posting sheet. Payroll, crib disbursements, and purchases journal entries are a by-product of source documents, such as (a) attendance cards, (b) disbursement requisitions, and (c) invoice register cards, since it is possible to create journal entry detail cards when source listings are prepared. As an example, a crib disbursement card is used in the shop as authorization to disburse supply items. These cards include, in addition to other basic data, the department account number to which the material is charged. Data are keypunched into the disbursement cards and a listing prepared showing each item disbursed by expense account within department. While the listing is being prepared on the tabulator, summary journal entry detail cards for each expense account by department are created.

When machine accounting completes keypunching the journal entry detail cards for an entry, a journal entry detail (EXHIBIT B) is prepared. The journal entry detail which replaces the posting sheet, shows the journal entry number, general and subsidiary ledger account numbers, expense account numbers, special suffixes to expense accounts, and the amounts for each account. This document is checked against the control total for the entry, and the general ledger debits and credits are verified as being equal.

A journal entry check list (EXHIBIT C) is next prepared by machine accounting from the detail cards. The check list shows the same information as the journal entry detail except that previous and current month's amounts and the difference between the two are listed in order to analyze fluctuations from the previous month and further serve as a check on the accuracy of the journal entry. Reasons for significant changes are noted on the bottom of this list, and are used in writing comments to the financial statements.

During the closing period, an intermediate ledger is prepared in order to determine the balance of various accounts, such as purchases, which must be cleared. As soon as all journal entries are complete and the detail lists verified as correct, machine accounting is notified to prepare the ledger (EXHIBIT D). It should be noted that our general and subsidiary ledgers are combined. This is accomplished by preparing journal entry detail cards for only the subsidiary accounts or general ledger accounts

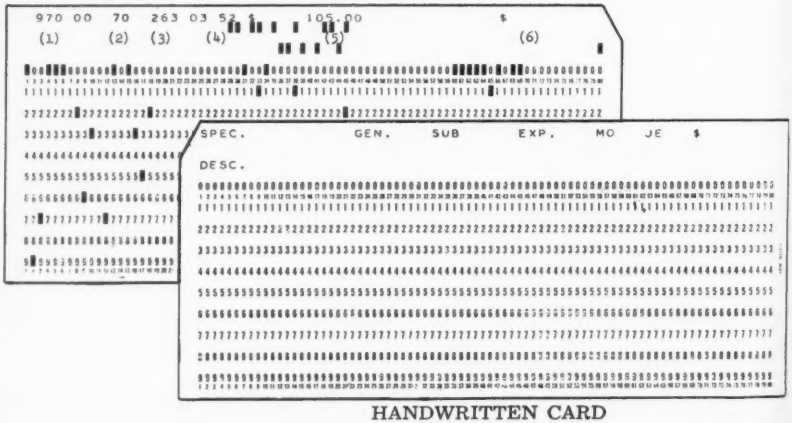
if the latter have no subsidiary accounts. Summary cards are created as a by-product of the ledger preparation. These summary cards, used for preparation of the trial balance (EXHIBIT E), include balances for balance sheet accounts and current month and year-to-date figures for profit and loss accounts.

Only after the listing of the trial balance can it be determined that the ledger is in balance as it is possible that a journal entry detail was not properly verified or cards were misplaced. If the trial balance discloses that the accounts are not in balance, it is a simple and relatively quick matter to sort the journal entry detail cards by journal entry number, and tab the totals to find the entry that is out of balance. We have not, as yet, encountered any type of error that could not be located and corrected in less than one hour.

As stated previously, under the manual system, departmental expenses were listed and sent to machine accounting for keypunching. We now sort out those journal entry detail cards pertaining to departmental expenses and prepare expense statements within a few hours after the ledger and trial balance are completed.

It should be pointed out, the above closing schedule for the Joliet plant is not indicative of the schedule followed in releasing corporate financial data. One of the problems now encountered is the transmittal of information between plants. It is hoped that in the future with further mechanization and faster transmission equipment, closing time will be further reduced for the entire company.

DETAIL CARD REPRODUCED FROM PREVIOUS MONTH'S CARD



HANDWRITTEN CARD

(1) General Ledger Account
(2) Subsidiary Ledger Account
(3) Expense Account
(4) Journal Entry Number
(5) Previous Month's Amount
(6) Current Month's Amount—to be handwritten in prior to keypunching. Journal Entry Description is punched in card but not interpreted.

EXHIBIT A—JOURNAL ENTRY DETAIL CARDS

JE #	General Acct.	Sub. Acct.	Expense Acct.	Spec.	Subsidiary	General
2 9	6	1	—	—	7,678	7,678
2 9	701	—	—	—	—	4,600 CR
2 9	704	—	—	—	—	10 CR
2 9	705	—	—	—	—	555 CR
2 9	854 20	—	—	—	—	2,500 CR
2 9	910	11	251	—	6 CR	—
2 9	910	12	259	—	2 CR	—
2 9	910	13	251	—	5 CR	—
—	—	—	—	—	—	13 CR
—	—	—	—	—	—	7,678
—	—	—	—	—	—	7,678 CR

EXHIBIT B — JOURNAL ENTRY DETAIL — 1958

JE #	General Acct.	Sub. Acct.	Expense Acct.	January	February	Over or Under
2 9	6	1	—	2,405	7,678	5,273
2 9	701	—	—	1,960 CR	4,600 CR	2,640 CR
2 9	704	—	—	40 CR	10 CR	30
2 9	705	—	—	405 CR	555 CR	150 CR
2 9	854 20	—	—	—	2,500 CR	2,500 CR
2 9	910	11	251	—	6 CR	6 CR
2 9	910	12	259	—	2 CR	2 CR
2 9	910	13	251	—	5 CR	5 CR

EXHIBIT C — JOURNAL ENTRY CHECK LIST

LEDGER

Date	Account Name	Account No.
2-28-58	General Bank Account	6

Description	Journal Entry Number	Current Month		Balance Or Accum. Total
		Debit	Credit	
General Bank Account—1st National 6 1	—	—	—	4,200
Cash Receipts	2 1	3,505	—	—
Advance to employees	2 10	—	150	—
Cash Disbursements—Misc.	2 27	—	2,255	—
	—	1,100	—	5,300*
General Bank Account—2nd National 6 2	—	—	—	82,700
Transfer of Cash from G.O.	2 2	349,000	—	—
Cash Disbursements—Accounts Payable	—	—	361,300	—
	—	—	12,300	70,400*
	—	—	11,200	75,700**

EXHIBIT D — LEDGER

CATERPILLAR TRACTOR CO. — JOLIET PLANT

FEBRUARY 1958, TRIAL BALANCE SHEET

			SUBSIDIARY LEDGER	GENERAL LEDGER
1		Petty Cash		500
6		General Bank Accounts		
6	1	General Bank Accounts—1st Nat'l	5,300	
6	3	General Bank Accounts—2nd Nat'l	70,400	75,700
30		Travelling & Other Adv.—etc.		1,600
45		Accounts Receivable—Misc.		4,300
70		Accounts Payable		143,500 CR
176		Production Inventory		
176	1	Production Inventory—Rough Mat'l	191,200	
176	2	Production Inventory—In Process	32,300	
176	3	Production Inventory—In Process—Labour & Burden	26,500	
176	4	Production Inventory—Fin. Mat'l	440,000	
176	5	Production Inventory—Fin. Labour & Burd.	190,600	880,600
180		Supplies Inventory		75,000
200		Fixed Assets		4,000,000
300		Res. for Depreciation		1,500,000 CR
800		General Office Control		3,703,400 CR
900		Profit & Loss		160,200
		Profit and Loss—Current Month		149,000

			SUBSIDIARY LEDGER	GENERAL LEDGER	YEAR TO DATE
910		Accounting		10,000	20,000
920		Administrative		4,500	9,900
930		Factory		75,700	160,100
940		Personnel		7,600	15,800
950		Engineering		12,300	23,400
1500		Scrap Recoveries		3,200 CR	8,500 CR
1600		Miscellaneous Income		100 CR	100 CR
1700		Material Variance			
1700	1	Material Variance—Rough	15,000		
1700	2	Material Variance—Purch. Fin.	35,000	50,000	104,500
1720		Depreciation		21,500	43,000
1730		Power & Gas		4,200	8,300
1740		Taxes		9,300	18,000
1750		Freight		8,900	16,400
1760		Indirect Expenses Absorbed in Invt.		51,700 CR	112,200 CR
		Profit and Loss		149,000 CR	298,600 CR

EXHIBIT E — TRIAL BALANCE SHEET

BY-PRODUCTS OF MECHANIZING

In analyzing various reports prepared from the trial balance and ledgers, we quickly concluded that the time spent in typing of the Statement of Operations and Financial Position could not be reduced by further mechanization. We then turned our efforts to reports requiring considerable analysis such as allocation of expenses, fixed and variable studies, cost of labour and material expended for capital additions, research and maintenance programs. As a result, we have been able to reduce costs and issue reports much earlier; the method of arriving at the expenses incurred in our engineering, research and maintenance programs is illustrated.

Our general accounting procedure requires the assigning of identification, job or order numbers to each machine, vehicle, building, or equipment and special or review work being undertaken by the engineering or research departments. Once the books are balanced and expense control reports prepared, it is only necessary to sort by job or order number and prepare listings used by maintenance personnel in analyzing costs of maintaining equipment or buildings and whether the equipment should be replaced or completely overhauled.

ADVANTAGES AND SAVINGS REALIZED

Preliminary studies of the mechanical system indicated that we could not expect to save any money, but we felt that the very small additional expense was justified when considering the faster closing which we fully expected to accomplish. We have proven that earlier closings can be attained without cutting off transactions at an early date. Less time and money are now spent on closing.

The ledger can be maintained by using basic punched card equipment only; electronic computers are not necessary and have not been used for this operation. The computer is used for our costing program, as mentioned earlier, and not in the preparation of the ledger.

A hidden factor that we had not expected was the ability to better schedule work throughout the month and to spend more time analyzing transactions as they occur to guide operating management in decision making. This is the field of greatest challenge to the industrial accountant today.

For further reading

PUNCHED CARD SYSTEMS: YES OR NO? Charles Moller, Cost and Management, Oct. 1958.

INTEGRATED DATA PROCESSING, H. S. Brown, Cost and Management, Sept. 1956

GENERAL LEDGER AS A TABULATING APPLICATION, W. L. Vick, N.A.C.A. Bulletin, Jan. 1956.

NOTICE OF EXAMINATION DATES

The dates for the 1959 examinations have been set as follows:

Accounting I	Monday, April 27
Industrial Legislation	Saturday, May 2
Accounting II	Thursday, April 30
Industrial Organization and Management	Monday, May 4
Fundamentals of Cost Accounting	Wednesday, April 29
Advanced Cost Accounting	
Paper I	Tuesday, April 28
Paper II	Tuesday, May 5

For time and place of the examinations, please consult your Provincial Society.

The Economic SCENE . .

by W. Allan Beckett

THE OUTLOOK FOR COMMODITY PRICES

As suggested in this column last month, the nature of the business expansion in 1959 does not imply a resurgence of price inflation, particularly for basic commodities.

Two real economic factors provide the basis for this conclusion. First, world supplies of nearly all basic materials remain reasonably ample as they have been since the onset of the recession two years ago. Second, business spending for new plant, machinery and equipment is not expected to grow significantly despite the general expansion. This will serve to restrain the increase in demand for many kinds of materials. The rebuilding of business inventories will impart more strength to demand than existed in 1958, but even this will exert little upward pressure on primary prices. Within the overall pattern of reasonably stable prices, individual commodities will experience different variations.

BASE METALS

Excess productive capacity still characterized the major base metals. However during 1958, the sharp price declines of 1957 were not repeated (Economic Scene, April 1958). For some items—copper is one—prices firmed slightly from the low levels prevailing at the start of the year. While the inventory position is now improved from the seller's viewpoint as compared to a year ago for most metals, no sharp pick up in demand is envisaged.

Copper, as mentioned, has firmed to .28c per pound, from .23c-.25c earlier in 1958. Increased activity in housing and appliances may keep demand a little firmer and a further 2c-5c increase may occur. However, a return to the inflated levels of 1956 is definitely not indicated.

Zinc remained steady at 11c a pound through 1958 and there is little to suggest any firming here during 1959. Lead prices moved up from 12c during most of the year to 13c at the year end. Here, improved sales of U.S. automobiles may stimulate some further strength in 1959, but again ample supplies are likely to keep price changes moderate.

For all three metals, tariffs and quotas imposed by the U.S. during the past year will serve to limit Canadian penetration of that market. In the absence of more decisive expansion there, removal of these restrictions is not probable during 1959.

The long strike at Sudbury served to emphasize the basic supply situation in nickel. Capacity is, and is expected to remain, ample and no change in the current 74c a pound price is indicated.

Aluminum is in the same situation and U.S. suppliers have sold on firm prices through to July 1st.

STEEL

Renewed activity in autos and appliances will lead to improved demand for steel in 1959. Sheet and specialties will make the best progress. No sharp increase in

demand is expected from the railways, from machinery and allied industries or from construction. As a result, it is doubtful whether demand, in even the seasonally best months, will press seriously against capacity in the United States. The prospects of a labour dispute at mid-year and a resulting price increase should not be ruled out. Part of this may be offset by hidden discounts or other trade offs. In Canada, the potential for making a price hike stick is somewhat greater as our basic industry operates at closer to capacity levels.

Tin prices are of course governed by the International Tin Agreement signed in July 1956, where the six largest tin producers outside Russia made provision for a buffer stock of 15,000 tons as a market stabilizer and set a floor price. Prices rallied from a low of 87⅛c New York in 1957 to 95c in 1958. U.S. demand has shown little signs of a sharp increase. World markets have felt the further impact of Russian entry, although supplies from this source have been limited to about 9,000 tons to date. Buffer stocks are currently above the agreed level and the spot price hovers slightly above the established floor price. No dramatic change from this situation is envisaged for 1959.

URANIUM AND IRON ORE

During 1958, uranium exports rose sharply and the new metal supplanted nickel as our number one mineral export. Prices and tonnage are set under current contracts which run until 1962. This year most producers will reach capacity levels and a further modest increase in exports will occur. Cost pressures are beginning to worry the industry. The situation after 1962 is also an unknown and producers now are actively seeking guarantees of a stable market after existing contracts expire.

Canada's other new mineral, iron ore, experienced a difficult year in 1958, a result of depressed conditions in the U.S. steel industry. This was accompanied by some downward pressure on prices. With prospects for further expansion in activity in 1959, exports of iron ore will recover some of the ground lost in 1958. It is doubtful whether earlier peak levels will be re-attained and thus no upward pressure on prices is indicated.

FOREST PRODUCTS

Some of the difficulties which began to beset the newsprint industry in 1956—falling demand, high publishers' stocks, competition from U.S. mills—ended about mid-1958. U.S. consumption and Canadian exports should rise moderately during 1959 but not at such a rate that capacity production will be achieved. This, coupled with competition from the U.S. mills, will serve to keep prices stable at $134 per ton U.S. Pulp prices remain steady at the 1957 year end level and any increase from here is improbable.

Lumber recovered part of the five per cent drop suffered in 1957. With activity in total construction expected to remain near current levels, stability in lumber prices is also indicated.

OTHER COMMODITIES

For many other commodities, similar factors will be operative—administered prices in the case of agricultural products such as cereal grains, oil seeds and cottons,

and balanced supply-demand relations for items like crude oil. Rubber prices may firm slightly as the auto industry increases its take, although future prices are currently trending seasonally downward. Activity in asbestos may pick up slightly after a poor year in 1958, but excess productive capacity will again militate against price increases. Potential Russian competition poses a threat in this area as well.

SUMMARY

In balance then, fairly easy supply conditions in the face of only modest increases in demand are likely to produce reasonable stability in over all commodity prices. There will, of course, be mixed and offsetting movements among individual commodities, but these too are expected to be modest in size.

At the same time, at the final demand level, especially in the case of consumer durable goods and services, activity will register a healthy rise in 1959. The potential for increased prices of final products will thus be somewhat greater than for primary materials. Thus the consumer price index is likely to register a further rise, probably of the order of 2 per cent.

At the moment, rising productivity is outrunning increases in wage rates. For industries nearer the final end of the productive process, falling labour costs, stable raw material prices coupled with a rising sales volume at better final prices, implies a considerable improvement in profits. In this framework, a mild demand-pull inflation seems more probable than a cost-push inflation during 1959.

TAX EXECUTIVES INSTITUTE TO MEET

This June 18-19 the Canadian Conference of Tax Executives Institute, Inc. will meet in Ottawa, the second such conference since T.E.I. was organized in Canada in 1956. It will be attended by Canadian and American members and will feature among the speakers and panelists senior officials of the Federal and Provincial tax departments.

The Institute, concerned with the field of corporate tax administration, is an organization of business executives responsible in their corporations for taxation matters on an administrative, policy-making level, or whose work for their corporations is principally concerned with problems of taxation. The organization, formed in 1944, has permanent headquarters and staff in Washington, D.C. and a membership of 1200 in 27 chapters in Canada and the U.S.A. representing many of the largest business organizations on the North American continent.

T.E.I. stands for the practice of the highest ethical standards in the administration of tax accounting and procedure in the preparation of tax returns, reports and other presentations; the establishment of confidence between management and tax authorities, and assists its members in many problems of taxation.

Chapters meet once a month to participate in discussion of tax topics or to hear a recognized authority on tax matters. Two chapters, in Toronto and Montreal, are now functioning in Canada and a third is being organized in Vancouver. The Secretary of the Toronto Chapter is Herbert Holland, Vice-President and Treasurer of John A. Huston Co. Limited, 36 Caledonia Rd., Toronto and the Secretary of the Montreal Chapter is Walter Johnson, Assistant-Treasurer of the Aluminum Company of Canada Limited, Sun Life Building, Montreal.

FINANCIAL PLANNING

By C. A. Kline, Jr.,
First Assistant Treasurer,
E. I. du Pont de Nemours & Company,
Wilmington, Delaware.

Its policies of financial planning and control can make or break a company. In this article, a successful company's policies and practices are examined and its basic financial philosophies discussed. Financial organization, forecasts, capital investment and return on investment are among the questions considered here in their short and long-term aspects.

SUCCESS in any phase of business requires a critical examination of the past and present as well as a practical or realistic appraisal of the near and long-term future—all of which can be expressed in one word PLANNING. The du Pont Company has a keen awareness of the importance of FINANCIAL planning and control and never makes important commercial decisions without examining the financial implications. An outline of the organizational structure will be helpful in considering the various aspects of our practices and policies in the field of financial planning.

ORGANIZATIONAL STRUCTURE

There are two main committees of the board of directors—a finance committee of eight members and an executive committee of nine members.

The finance committee carries responsibility for all financial affairs of the company—a somewhat vague definition, since there are very few activities of any profit-making organization which do not have financial aspects. However, some examples of matters within their jurisdiction are dividend recommendations for action by the board, bank relationships, approval of authorizations for expenditures in excess of certain amounts and determination of investment policy.

The executive committee is made up of the president of the company, who is chairman, and eight vice presidents. It has charge of the operating end of the company's business. Its members have no administrative responsibilities, thus leaving all their time free for formulation of operating policies.

There are 11 industrial departments, each headed by a general manager who reports to the executive committee. Each general manager is responsible for the manufacture, sale and profitability of products assigned to his operation. Within broad limits of policy laid down by the executive committee, he runs his department as though it were a company in itself. There are 14 auxiliary departments such as legal, purchasing, employee relations, traffic, public relations, and others—all of which report to the executive committee except the treasurer's and secretary's departments, which report to the finance committee but also have certain responsibilities to the executive committee.

Mr. Kline has been with du Pont since 1937 rising through various clerical, supervisory and executive positions in the Treasurer's Department to his present position as First Assistant Treasurer. He is a graduate of Pennsylvania State University in commerce and finance and a member of the Delaware Accountants Association.

FINANCIAL TOOLS FOR PLANNING

The du Pont Company's treasurer is the officer charged with responsibility for all work related to financial matters. He and his staff supply all company management with the financial tools to aid in reaching policy decisions. These tools consist of accounting records, budgets, forecasts and special-purpose reports relating to matters of continuing interest or requiring particular attention as occasions arise. A few periodically recurring reports, fairly well standardized in form and designed primarily to keep management informed on past accomplishments and present conditions will be presented in this paper.

Each quarter the finance committee receives the consolidated balance sheet and income statement with rather complete underlying detailed schedules.

Each month the finance committee receives a statement of the cash position with details of receipts and disbursements in condensed form, and a statement of various other items of working capital. Each of the statements shows current month and comparison with forecast.

A monthly statement of sales, operative earnings, and consolidated net income keeps the finance committee informed of the level and trend of sales volume and resulting operating profits of each segment of the business. Pertinent factors of turnover, profit margin, and return on investment compared to forecast and previous year are set forth for each of the investments.

The executive committee receives somewhat similar information on sales and earnings from statements contained in the monthly operating reports of the general managers. These statements show more detailed information by major products or product lines.

The executive committee is also informed as to the financial results of industrial department operations by means of periodic review of our "Executive Committee Charts".

There are in total some 400 charts and tabulations comprising some 35 chart series. A number of these are reviewed by the executive committee each month in the course of a program which calls for every chart being reviewed at least once every quarter.

A book containing "current trend charts" is maintained for the desk use of the executive committee members. This includes one chart showing commercial billings which is released three times monthly—at the end of two weeks, at the end of three weeks, and when the month is completed. There is a current trend chart for each operating investment—designed to give a quick view of pertinent data essential to judging the condition of the business.

BUDGETS AND FORECASTS

Budgets, covering such items as advertising and research expenditures and expenses of auxiliary departments, are prepared annually. But forecasts of sales, earnings, and cash position are made up each quarter looking 12 months ahead. Each forecast shows figures for the individual months of the initial quarter and quarterly figures for each of the three quarters remaining.

Forecasts of *sales and operative earnings* (that is, earnings before non-operating expenses—mainly taxes) originate in the several industrial departments where the

products are manufactured and sold. These forecasts include the allocated portion of expenses of the 14 auxiliary departments.

The industrial departments' forecasts are sent to the treasurer's department where responsibility rests for putting them together into an over-all company forecast of sales and earnings. This forecast of sales and operative earnings is transmitted by the treasurer's department to the executive committee for approval.

A forecast is also made of *construction authorizations and expenditures* (sometimes called a "capital budget") which is put together each quarter by the central engineering department with the assistance of the industrial departments. This forecast describes the anticipated plant authorizations and expenditures in considerable detail and is submitted to the executive and finance committees for approval. It is then ready for use by the treasurer's department in forecasting the cash position.

Approval of the construction *forecast* is not an authorization to spend money.

The next step in the forecasting program is the forecast of *net income*. Starting with the now official forecast of sales and operative earnings, the treasurer's department forecasts certain items of non-operating expenses and income, calculates the provision for taxes—and finally arrives at the net income forecast available for the common stock. This, along with data on the cash position forecast, which has taken into account the approved construction forecast, is included in the treasurer's report to the finance committee serving as the basis for dividend consideration in February, May, August, and November.

This brings the program to the matter of projected *cash position*. There are two parts to this forecast. Careful estimate is first made of the amount of cash that should be in banks, or in government securities or commercial paper readily convertible into cash, to provide for operating and construction needs for the immediate year ahead. This is called "Desirable Cash". Next, is computed the amount of "Available Cash". The latter is the amount of anticipated cash after earmarking the needs for payment of Federal taxes. Cash equal to our accrued tax liability is not regarded available for the day-to-day cash needs of the business. Forecasts of both "Desirable Cash" and "Available Cash" are included in the previously-mentioned quarterly dividend reports to the finance committee.

Determining the amount of *"Desirable Cash"* first requires forecast of immediate day-to-day needs based on anticipated disbursements for operations and for construction. The calculations next take into consideration the possible need for increased working capital because the forecast may not, in the treasurer's department's judgment, make sufficient allowance for such things as possible higher prices for purchased materials—and also the possibility of a higher level of operations than is forecast. The amount (if any) by which cumulative forecast of cash disbursements exceeds cumulative forecast of cash receipts (excluding receipts and disbursements for working capital purposes) is then taken into account. To this is added an arbitrarily determined amount for contingencies such as destruction of an important producing facility, stockpiling of inventory beyond calculated expectations, slow-up in customer payments, etc.

Both "Desirable" and "Available" Cash are computed at the beginning *and end* of the forecast year. This permits measurement of probable cash availability within the scope of the possible cash needs—over the year ahead. Moreover, the compari-

son at the end of the forecast year indicates the cash situation beyond that period. The ordinary sources of "Available Cash" are accruals to reserve accounts and earnings—cash so provided pays for construction, increase in working capital, and dividends.

These various steps are important parts of the continuing program of financial planning. The accounting record, budgets and forecasts are utilized as an integrated system.

RETURN ON INVESTMENT PHILOSOPHY

There are two basic philosophies in the du Pont company's field of financial planning. For many years the company has operated on the theory that with a large capital outlay committed to the manufacure and sale of goods it can best measure and judge the effectiveness of effort in terms of "return on investment". Many of the reports and statistical data include some analyses of the underlying factors which have an important effect on "return on investment". By isolating the causes of changes a satisfactory or basic return is determined. Further trouble spots or diminishing returns are focused enabling prompt decision as to the proper course of action to be taken to correct the situation. Having in mind at all times in financial planning that a satisfactory return *is* the ultimate measure of success, the habit is formed in day-to day efforts of almost unconsciously measuring the effect of decisions in terms of "return on investment".

CAPITAL INVESTMENT PHILOSOPHY

The other major area in financial planning is the du Pont Company's *capital investment philosophy* and the technique of planning and controlling such investment. Research, its discoveries and the subsequent decisions regarding capital investment, are of considerable consequence in determining the success of any corporate enterprise. The du Pont Company's expenditures in this category now run, in the aggregate, at an annual rate well in excess of a quarter of a billion dollars and therefore call for major attention.

Financial considerations include determination of the source of funds to finance the venture. It is desirable to avoid borrowing capital for permanent employment in the business. To do so would involve an obligation to pay interest charges and to repay loans, which might become an intolerable burden if business should be severely depressed at some future time. The preference is to reserve the "ability to borrow" for possible use in meeting some extreme emergency. It is usual practice to finance plant expansions, and the associated working capital requirements, from within — primarily by retaining a portion of each year's earnings and utilizing funds made available through depreciation set-asides. Currently, provision for depreciation and obsolescence is running at a rate of about $120 million a year, and therefore is an important source of cash for new capital.

The du Pont Company lays heavy emphasis upon research. There is a continuing drive to discover opportunities for new capital investments which will yield attractive returns in the form of profits and at the same time meet the needs of the consumer. Many new products, in their original form, yield a satisfactory level of profit only over a relatively short period of years. The consumer with his constant demands for increased satisfaction, or the competitor with his constant drive to have the

consumer use his product, or both, are the ever-present forces of competition which spearhead technological progress. This means that as new processes or new and improved products are developed the use or demand for others may decline or become obsolete, and they thereby fail to yield a satisfactory return.

Capital investment philosophy may be said to consist of three basic elements—(1) strive continuously, through research, for attractive new investment possibilities, (2) finance new investments to the maximum extent practicable from funds made available from within the company and (3) screen operations periodically so that a satisfactory level of "return on investment" will be maintained—either by improvement of process and product or by elimination of operations where profit levels are unsatisfactory.

New opportunities for investment of capital funds come frequently to the surface in a large and diversified company. This is because research programs and product developments progress simultaneously on many different fronts. There is always the question—*How to decide where to invest funds?* First, in answer, there is considerable broad program planning which sets the approximate dollar size of our construction program and determines the general character of the facilities to be built. Secondly, there is a comprehensive critical examination of the merits of each separate project at the time it comes up for authorization.

The broad program planning is developed at various staff levels and brought to a conclusion by the executive and finance committees. For that purpose the committees use both our regular quarterly forecasts and periodic long-range forecasts to obtain as close an approximation as possible of the amount of cash that will be available over the next year or so for construction purposes. Such an examination shows how large a construction program can be handled before encountering a cash stringency.

Rules regarding capital project authorization require that a brief, orderly review of all related matters be set forth in project papers, which are prepared in a fairly standard form most helpful in reaching decisions for project authorization. In addition to matters which are strictly financial in nature, many projects include one or more factors in the area indirectly related to finance. For example, if a new plant site selection is involved there will be answers required to such important questions as these: Are there reliable and convenient banking facilities available both for depositing working funds of the company and for the needs of employees? Finally, that all-important key question—What are the best estimates as to probable sales, profits, and necessary investment, and the prospective "return on investment" based on those factors? It is in this manner that committees have brought before them data pertinent to a decision to approve or reject the proposed new operation.

MEASURING PLANNING EFFECTIVENESS

New facilities must justify their existence through actual performance. As one method of measuring how effective planning has been, accomplishment reports are required which show actual operating results achieved from new facilities. For each construction project authorized by the executive committee on a "return on investment" basis, an accomplishment report must be submitted by the general manager after the first year of operation has been completed. The committee may—and

frequently does—ask for a supplementary accomplishment report to be submitted in a succeeding year or two, if it feels the project's "shake-down" to normal operation is not yet complete.

Still another significant feature of financial planning is the periodic critical examination of any declining profit situations in order that management may reach sound decision upon a course of action. In a diversified company, erosion of product profitability poses a real problem for alert and forward looking management. The more product diversification, the more urgent is the need for this aid to top management. Diversification provides a greater opportunity for satisfactory profit operations to obscure the unsatisfactory profit situations. The decision may involve abandonment of the manufacture of a product line or even the entire plant site. It is therefore, highly important to force to the surface the profit facts surrounding a "low-return" facility investment.

"Low-return" facilities are examined under "Rules For Review Of Low-Return Investments". These rules have been in use a number of years. Certain standards are set as to what constitutes a low return investment, and each industrial department is required to report annually to the executive committee in considerable detail on individual products falling in this low-return category—except as to products in the early development stage, or those in the process of discontinuance, or which must be manufactured to meet company requirements in other lines. These annual low-return investment reports provide the basis for comprehensive analyses as to future prospects of the products involved and sound judgment as to whether the individual operation should be continued or abandoned.

CONCLUSION

These various aspects of the du Pont Company's practices and policies in the field of financial planning are considered by the management of du Pont as of the highest importance in both its short and long-term planning. While such procedures and philosophies do not guarantee the future success of an enterprise, they do give a close and critical scrutiny of "Where do we go from here?"

For further reading

FINANCIAL COORDINATION THROUGH TOP MANAGEMENT, By R. Burt Gookin, Cost and Management, July-Aug. 1958.

RELATING FINANCIAL POLICIES TO THE ECONOMIC OUTLOOK, Panel Discussion. Cost and Management, July-Aug. 1958.

FINANCIAL MANAGEMENT IN A CHANGING ECONOMY, By Dudley E. Browne, The Controller, Feb. 1958.

TOPICAL

comments *by N. R. Barfoot*

LOOKING AHEAD

The 1960's will be here in less than a year. What will they offer? Technology is advancing at such a rate that a dazzling future could be ours. The exciting part of the next decade may well rest on our philosophy towards work, individual productivity, the use of abundance and the acceptance or not of ethical standards.

In any case, here are some of the possibilities:

- shorter work week
- man will land on the moon
- battery-operated T.V. sets. Wall television
- reliable weather forecasting, panel lighting for houses
- gas turbine trucks and buses, introduction of irradiated goods
- major advances in treating arteriosclerosis, cancer cure
- 2,000 MPH airliners, competitive nuclear power
- rocket mail and freight service, machine translation of languages
- substantial control over tornadoes and hurricanes
- all-electronic cooking ranges.

Canadian shipping fleet may again be a reality. The government is planning a change in shipping policy to produce a sizeable and prosperous Canadian-owned fleet. In the main, the method will be increased capital cost allowance (up to 160% depreciation for new vessels built in Canada) and 140% for new ships built anywhere for assignment to U.K. registry. In 1945, we had 172 deep sea ships and now have only 13.

ON THE PERSONAL SIDE

Dental problems increase as you get older. Gum diseases such as gingivitis (pink and tender gums) and pyorrhea (infected pockets and gum recession) cause 80% of tooth loss in adults.

- Untreated gum disorders cause bone erosion which loosens teeth and prevents proper bite
- Malocclusion or improper tooth and jaw relationship often cause gum disorders
- Teeth that meet and mesh unevenly rock and jar each other, and eventually may loosen
- About 15% of all orthodontic patients are adults. Such treatment may take from three months to three years and may cost from a few hundred to several thousand dollars.

• Dental care is considerably less painful these days. Tranquilizers can be administered and gums desensitized so that anesthetic injections are not felt. New high speed drills work with a *feather-light* touch.

Winter care for some of those gadgets on your new car is important. Air conditioners should be turned on at intervals to lubricate compressor seals. Convertible top mechanisms should be operated from time to time, and air springs require anti-freeze protection.

OF GENERAL INTEREST

Italy spent nearly $63 million in Canada last year and this was almost double the year before. A very great variety of commodities were purchased ranging from wheat, flax and rape seed to aluminum, drugs and chemicals, scrap iron and nickel.

• Canadian purchases in Italy totalled $33 million in the same period. The biggest items were wool fabrics, canned tomato products and office machines. A great variety of specialty lines peculiar to Italy made up the bulk of the list, including wines, shoes, silk articles, accordions and religious articles.

International law in the air is becoming a bit involved. For centuries certain international laws have governed shipping on the high seas. Piracy, rights of ships to travel through territorial waters, nationality of births etc. have all been settled, including the general legal authority of the captain over passengers. No such order exists in the air. For example—air space over a country belongs to it by the Chicago Convention of 1944. Therefore, air crews and passengers are subject to the laws of the country over which they are traveling. Nationality of children born during air travel is by no means clear. An air captain has no legal right to detain, restrain or order a passenger. As distinguished from an aircraft, a ship is an entity in itself and its captain is complete master of what amounts to a detached piece of his country. No such clear-cut definition applies to aircraft.

The International Civil Aviation Organization (ICAO) will make recommendations this year to straighten out the air tangle. Implementation will undoubtedly take several more years.

Natural Gas is finally an actual fact in the Canadian energy field. After much controversy and investigation, natural gas has arrived in Eastern Canada.

• The Trans-Canada Pipe Line from Alberta to Montreal was completed last October

• Canadian Gas will be flowing this year or next into the U.S.

• Gas reserves have been expanding at the rate of 2.5 trillion cubic ft. per year since 1950. Last year we consumed only one tenth of what was found.

• It is estimated that findings will average 2 trillion cubic ft. per year for the next 30 years and possibly fall off to 1.5 trillion after that

The Alberta Oil and Gas Board estimates findings of 51 trillion cubic ft. in that province in the next three decades, of which 44 trillion would be excess to Canadian needs.

• B. A. Oil experts claim that 100 trillion cubic ft. could be discovered in the next 25 years if proper market incentives are used.

• All of these forecasts are of interest for export reasons and will probably influence the government and/or the proposed National Energy Board of the Borden Commission.

COST REDUCTION PROCEDURES

By Bernard H. Levy,
Partner, Campbell, Goldstein and Glade,
New Orleans, Louisiana.

In an era of constantly increasing costs, cost reduction becomes doubly important. This article outlines procedures for putting cost reduction into operation, from the preparatory stage of creating the proper psychological atmosphere to final reporting of results. The types of cost reduction programs, organization, and some of the tools for achieving reductions are discussed, as well as check list of areas where cost reductions can quickly bring substantial savings.

PERHAPS THE BEST WAY for a cost accountant to gain the recognition and respect of top management is through recommendation of successful plans to reduce operating costs. While the services of the accountant are valuable to all divisions of the organization, nowhere is it easier to prove this value than in the field of cost reduction.

In the present era of constantly increasing costs, the application of cost reduction techniques assumes more and more importance. It is important enough to be treated as an independent and essential activity, calling for establishment of a special committee or department.

There are several general methods for increasing profits, such as increasing unit selling prices, without loss in dollar volume; increasing unit volume of sales, without reducing unit selling prices; concentrating on more profitable lines; or reducing costs. Only this last method can be readily controlled in a competitive economy, where sale prices and volume must meet the many forces of the market place.

ARGUMENTS FOR COST REDUCTION

The arguments for cost reduction are many. During a period of inflation many extra costs tend to creep in, which are always attributed to current conditions. Many concerns with no competition lose the incentive to keep costs down and are unable to meet competition when it does arise. The complexities and ramifications of modern business make wasteful costs difficult to uncover. Many successful organizations just naturally drift into extravagances. Innovations in equipment, processes, materials and methods and new personnel demand continuing attention to cost reduction. Among the general benefits of cost reduction for the individual company, we find first and foremost the betterment of the company's competitive position. Cost reduction will help forestall consumer resistance to higher prices by keeping prices down.

A Certified Public Accountant, the author has worked for C.P.A. firms in New York and New Orleans and has been a partner of the accounting and management consulting firm of Campbell, Goldstein and Glade since 1951. A native of New Orleans, he attended Tulane University. A member of the American Institute of Certified Public Accountants and the Society of Louisiana Certified Public Accountants, he has been teaching a course in report writing for staff members of New Orleans C.P.A. firms for the past two years.

From the standpoint of the national economy, cost reduction raises the standard of living: lower costs mean lower prices.

Cost reduction merits careful planning and programming. It should be used on a much broader scale than now found.

OBSTACLES TO OVERCOME

Despite these many advantages, for a variety of reasons, not everybody is anxious to get on the cost reduction bandwagon.

In the field of labour, many stumbling blocks must be overcome. Primarily, labour fears that the purpose of any cost reduction program is to reduce the number of jobs available. The program will be met with apathy and a general lack of enthusiasm. Sometimes deliberate slow-downs, due to misunderstanding or distrust of management motives, will be encountered. Past failures in cost reduction and similar experiences will make labour scornful of any new efforts. Moreover, a normal resistance to change is to be expected whenever anything new is attempted. In the management field, the obstacles are probably more serious, because this is where the program must get its impetus. Other demands on executive time, which are unfortunately given priority, offer formidable competition for cost reduction programs. The right personnel for the work are seldom available; those best qualified are needed in other departments and their release for cost reduction work requires much effort. Jealousies between factions may be stimulated in this type of program. Some executives may fear criticism of their own work and are reluctant to support any program which might delve too deeply into their domains. Management often lacks the vision to sight cost reduction opportunities. These obstacles thrown up by management may not be readily apparent and are often clothed in an attitude of passive resistance.

HOW TO OVERCOME THE OBSTACLES

In attempting to overcome these obstacles, one may first adopt a psychological approach. The following suggestions come under that category. Since it must be a continuing function, cost reduction should be developed as a state of mind. Bring everyone into the act, put them "on the team." Explain the program to all personnel fully; don't adopt a secretive attitude (people oppose what they don't understand or feel part of). Ask for cooperation; install suggestion systems. After all, the men closest to jobs are most likely to think of possible solutions to cost reduction problems. Furthermore, people never oppose changes suggested by themselves, while they resent changes forced on them. Explain the program to the unions and request their cooperation. Point out the benefits to each worker; show how the program affects his job, his security, the competitive position of the company and possible wage increases. The help of supervisors should be enlisted in explaining the objectives frankly to the workers and ensuring their cooperation. Be sure the workers know the program has the active, unqualified support of top management. Promote a competitive spirit, which can generate a great deal of enthusiasm. Give full credit where credit is due; praise brings better results than criticism. Be sure all executives understand that the program is not conceived to collect criticism and that support and cooperation are necessary to its successful completion.

When the proper psychological atmosphere for the cost reduction program has been created, it is time to look at practical considerations.

First, thoroughly define the program, its scope and objectives. Plan it carefully. See that it has authority, organization and direction. Choose carefully the personnel who will conduct the program. Publicize it throughout the organization. Decide on specific goals, then work towards them. When the program is completed, measure the savings and publicize the results, favourable or otherwise. Finally, use the successes gained in one program as the base for the next.

TYPES OF COST REDUCTION PROGRAMS

Now for an outline of the various types of cost reduction programs. The term "cost-reduction" may be used in a very broad sense; it may cover a limited objective or a grandiose plan. For example, it may be applied to any one of the following programs:

1. A single item of expense, such as fuel
2. One element of cost, say direct materials
3. A group of operations, such as a section of an assembly line
4. A single product manufactured
5. One department, say maintenance
6. A specific situation (excessive idle time, for example)
7. An improved technique
8. Several specific projects
9. All factory operations
10. Every phase of business, including distribution and administration

Cost reduction programs may also be classified as either short or long-range. Short-range programs usually concentrate on urgent problems. They are often devised to correct special situations, such as a fall in profits; a product being undersold by competition; a specific operation which appears to be costing too much; sudden increases in costs; or certain operations which are obviously inefficient and offer possibilities for quick and substantial savings. Where more than one of the above situations exist, they may of course be tackled concurrently in a short-range program.

Long-range cost reduction programs are often similiar to long-range budgets. They often involve capital expenditure and have as their goal a major reduction in cost. Examples of this type of program include better plant layout; relocation of plant; modernization programs; and materials-handling improvement. Long-range programs sometimes cover every aspect of the business.

ORGANIZING FOR COST REDUCTION

The type of personnel to be used in cost reduction work should now be considered. The above programs may be accomplished by one individual, by a committee, or by a cost-reduction group, depending on the size of the organization or the nature of the project.

Personnel from within the organization may of course be used, if qualified men are available. Using company men does have certain advantages. They have a better

knowledge of the business and its idiosyncracies. The cost is moderate if assignments are efficiently carried out. Complete control over their work is possible. In some cases, they may be able to get better teamwork.

Concerning the use of outside consultants, the following quotation from an article by Walter Scott, director of W. D. Scott & Company of Sydney, Australia, seems to cover the subject thoroughly:

"Outside consultants have the following advantages:

1. They probably have more specific experience and are more expert in the way to conduct the program, to expedite its completion, and to carry out specific assignments.
2. They usually have within their organization people specifically trained for the kind of work required and with a highly developed aptitude for digging into problems, unearthing facts, and analyzing and interpreting them.
3. They are not beset by organizational or personnel loyalties which may interfere with or unduly influence their actions or findings and can therefore adopt an interested but impartial attitude. They can sometimes say from the outside what it is difficult to say from the inside.
4. They can devote all their time and attention to the task involved and are not beset by the host of everyday problems which cut into the time of inside personnel who are not full time on cost reduction.
5. They frequently have a knowledge and experience of what has happened in other places in comparable situations.
6. They often have the ability to work quickly and effectively within the client's organization, thus obtaining results earlier and consequently earlier savings. This may ultimately make use of the consultant less expensive than carrying out the assignment from the inside.

Outside consultants are generally used for specific assignments such as a sectional methods-improvement program, the installation of an incentive plan, a training program to improve productivity, or the overhaul of production-planning procedures. For wider programs involving committees and extensive operational work, the personnel is usually chosen solely from within the organization or the work is divided between such personnel and outside consultants."

The use of various types of personnel is governed by the program being undertaken. For example, on a project involving a single item one engineer might be assigned. If the project were an investigation into the high cost of indirect materials, the assignment might go to a committee comprising representatives of purchasing, factory, and costs. A program involving study of an entire assembly line might be assigned to a committee composed of representatives of factory, design, tooling, and costs.

STRUCTURE OF A COST REDUCTION COMMITTEE

A more detailed look at the structure of a typical cost reduction committee would perhaps be helpful. If the goal of a program is to cover all operations, a special organization for cost-reduction is required. This sort of program might be supervised by a general cost reduction committee, which would report to the president

or vice-president. It is usually comprised of: the plant manager, design engineering manager, sales manager, plant accountant, purchasing agent, and the office manager. The vice-president may be appointed chairman of the committee.

This committee would transmit orders to various divisional or sectional sub-committees or groups.

Each of the committees and groups mentioned above should have well defined duties. The personnel must possess the skills required for cost-reduction work. They should be familiar with or have access to certain management tools, which we shall call the tools of cost reduction.

THE COST ACCOUNTING DEPARTMENT

The first tool to be used is the cost accounting department and the reports and analyses prepared by that department.

Let us first distinguish between cost reduction and cost control, because there is a difference. Cost control is chiefly concerned with seeing that costs do not exceed established standards; cost reduction endeavors to push costs downward and is not concerned with standards, in fact, views them with suspicion. However, target amounts may be set in cost reduction. Cost control attempts to get the best results at the lowest possible cost under existing conditions, while cost reduction concedes no condition as permanent if a change will bring a lower cost. In cost control, then, there is a comparison of the present and the past; in cost reduction, the comparison is of the present with the future.

In spite of the differences between cost control and cost reduction, detailed analyses from the cost accounting department are extremely valuable in cost-reduction work. They furnish ready answers as to where, how much, and even why costs are high. These analyses, divided as they are into elements of material, labour and expense, can immediately direct attention to the most important category. For example, if material is 80% of total cost, this is obviously the first element to tackle in a general program. In a standard costs system, losses shown through variances in the analyses indicate where to make a preliminary effort. The cost-reduction committee should attempt both to reduce costs to standards set and to reduce those standards. If the standard cost analyses show reasons and causes, the cost-reduction work is speeded. For example, the cost of idle time invites prompt attention, and may possibly be reduced quickly. Cost analyses also give valuable information regarding alternatives and their respective costs. They further aid in calculating savings made through previous cost-reduction programs. The cost accounting reports are essential in evaluating the effectiveness of cost reduction.

BUDGETS AND BUDGETARY CONTROLS

Budgets and budgetary controls are excellent tools for cost reduction. The budget plan provides many possibilities. In preparing the budgets, the budget committee will have obtained information which is invaluable to the cost reduction committee in highlighting areas to be studied. They will also have found some of the weaknesses and wasteful operations of the business which the urgency of budget preparation does not afford them time to correct. However, the figures developed by them are made to order for the cost reduction committee. In addition, budgetary control operations

will show deviations from planned figures, the reasons of which also invite investigation. Budgets are often the best source of information on distribution and administration costs.

THE BREAK-EVEN CHART

The break-even chart is a tool that is relatively unexplored in the field of cost reduction. A break-even chart can indicate many factors in the profit structure which deserve close scrutiny.

As an example of what a simplified break-even chart can indicate, here are eight significant points in a typical chart:

1. The break-even point itself
2. The profit path above the break-even point as an indication of inherent profitability
3. The standby cost relationship to other costs and sales values at the break-even point and at other capacity levels
4. The break-even point in relation to normal output
5. The maximum output
6. The variable costs in relation to sales
7. Sales
8. Relationship of variable and standby costs at any level of output

The accuracy of the chart may be tested by comparing with the figures on the profit and loss statement.

This tool has innumerable uses in cost reduction. For more information on break-even charts, an excellent source is Fred B. Gardner's book, *Profit Management and Control.*

TOOLS WHICH ACTUALLY PRODUCE THE SAVINGS

The tools already mentioned are designed to obtain information and calculate savings. Now we should look at the tools which actually effect cost reduction.

Methods Engineering is often the biggest source of savings. Methods engineering is most valuable for analyzing present methods, suggesting alternatives, effecting savings through reduction or elimination of motions, and developing ideas for quicker or easier methods. Plant layout and material-handling improvements are specific examples of methods engineering work.

Work Simplification and Standardization are closely related to methods engineering, often forming part of it.

Time and Motion Studies give much factual information of obvious value in cost reduction. Time studies are a necessary preliminary to installing an incentive plan.

Illustrating the practical application of some of these tools, is the following case history from our firm's experience:

The problem was to determine the proper number of employees needed to handle the various work loads in a resort hotel and restaurant which was subject to the seasonal variations peculiar to that type of business.

Cost-reduction techniques paid off to the tune of some $244,000 which represented a payroll savings of approximately 25%.

The major steps taken in this program were:

1. The job classification indicated by the payroll records were studied and revised.
2. Job descriptions were then written for each position, based upon discussion with the employee and his or her supervisor.
3. The individual operations for each position were observed and time studies to develop standard times were usually made.
4. Basic units of output were developed; for example, in the kitchen the basic unit was the number of covers prepared.
5. The standards and basic units of output were used to determine payroll requirements in the form of man-hours for various levels of operations.
6. The standards were discussed with the various unit managers and turned over to them as a basis for organizational development and budgetary payroll control.

The extent of inefficiency uncovered in the study came as a tremendous surprise to management. A huge waste in man-hours resulted from such practices as hiring people long before the beginning of the season; holding on to employees after the busy season had terminated; paying overtime for time not worked, etc.

Employee Motivation Studies are extremely useful in cost reduction. They can be more than a little complicated, especially where female workers are concerned as one such study, described in a current publication, discloses.

In this case, involving female inspectors in a plant, management felt that the inspectors were capable of working at a higher rate of speed. The logical approach was the installation of some type of monetary incentive plan. This was done and the improvement in the production rate per inspector was substantial, but the methods engineers were convinced from their capability studies that the inspectors could achieve even higher levels of performance.

Interview results showed that only a small percentage of the inspectors relied on their wages as a primary source of support. Most of the workers were either young girls just out of high school, living at home and working until they got married, or married women working to supplement their husbands' incomes. It was therefore concluded that extra time would be much more valuable to the inspectors than extra money. To test these conclusions a "time-off" incentive system was instituted. A weekly production quota was established, and when an inspector reached the quota she could go home for the rest of the week. She received, of course, a full week's pay for her work. Under this system, production increased dramatically and a number of the girls were actually able to complete five days work in two days. This represented a 250% increase in the production rate normally achieved in the plant.

Investigation of the use to which the inspectors put their extra time revealed a number of new and powerful sources of motivation. One woman, for example, wanted the additional time to spend at home with her children. The best inspector, who outstripped all others by far, had a husband who worked on the night shift. In short, this case showed that contrary to popular opinion, money was not the most important incentive to this group of workers. Time was more important than money and they were willing to work harder to get it. Needless to say, the cost reduction possibilities in this study are unlimited.

Statistical Analyses cannot be ignored as tools in cost reduction, if only because of their great value in quality control. If a better balance can be obtained in the quality-control factor between inspection and defective work, cost reductions often follow. Statistical analysis is also of great value in carrying out other sections of the cost reduction. Faulty organization often lies at the root of inefficiency and the con-

Flow Process Charts are often used in connection with methods engineering. They are most valuable in reducing material-handling costs, and also useful in office costs, warehousing, and transportation, which do not often come under as close scrutiny as production.

Organization Charts and Manuals should be considered of prime importance in cost reduction. Faulty organization often lies at the root of inefficiency and the consequent wasteful expenditures. Duplication of control, overlapping responsibilities, and wasteful efforts usually result in excessive costs. Organization charts and manuals will disclose these weaknesses and indicate ways to correct them.

The Management Audit, which comprises a thorough and comprehensive survey of every aspect of the organization, is a vital tool to a cost-reduction committee. It is generally performed by outside consultants. It offers valuable sources for investigation, and is often the informational basis for subsequent cost savings.

As a case in point, our firm recently made a management audit of a fairly large department store. The audit covered office methods and procedures, cost reduction, office layout, company organization, reports to management, job descriptions, standards of performance, and evaluation of the personnel department and management positions. Although this is not yet complete since the merchandising aspects have yet to be covered, it does give an idea of the areas included in such an audit.

On the strength of the management audit, we found a number of cost reduction possibilities, primarily in payroll. For example, the number of floor cashiers could be reduced from 17 to 11, at a savings of $9,000 per year. Savings in advertising, delivery, housekeeping, and alterations amounted to another $9,000.

In using all the cost-reduction tools, the personnel directly concerned must take pains to see that the program is thoroughly understood, and that the tools are used in liaison with all personnel affected.

COST REDUCTION REPORTS

The accurate, prompt and continuous reporting of savings is necessary for the following reasons:

1. It is important to measure the savings against the cost of making the savings.
2. It indicates just how successful the cost-reduction program has been, so as to improve it by adding procedures.
3. Publicizing the results will secure more enthusiasm and cooperation for subsequent stages of the program.
4. It points out which sections of the business are producing the most savings.

CHECK LIST FOR A COST REDUCTION PROGRAM

In order to visualize some of the steps in a cost reduction program, there is presented below part of a check list that might be handed to personnel chosen to see what savings could be made in a small factory. It is designed to indicate the more usual places for quick cost reductions.

Under the caption of factory operations

In connection with materials:

1. Check the amount of waste and scrap.
2. Investigate whether better or cheaper materials can be used in the product.
3. Cut down inventories. The cost of keeping goods in stock is high.
4. Get rid of slow-moving lines.
5. Look at storekeeping costs.

In connection with labour:

1. Improve the time cycle for operations.
2. Reduce the time spent between operations.
3. Reduce the setup times.
4. Reduce idle time by tracing it to:
   Available work not scheduled
   Lack of materials
   Lack of instructions
   Lack of power, or
   Waiting for repairs
5. Note the efficiency of operators.
6. Decide if it would pay to use subcontractors.
7. Examine the possibilities of developing better tools and machine design.

Under the caption of expense:

1. Analyze every item of expense in the account classification, with the thought of removing all extravagances.
2. See if you can change fixed costs into variables.
3. Improve the quality of supervision.
4. Watch for wasted time and materials in repairs and maintenance.
5. See if delivery services can be streamlined to avoid unnecessary deliveries.
6. Find out which trucks have excessive repairs or fuel costs.

Under sales costs:

1. Compare the costs of various sales areas, and ascertain if some areas are justifiably costing more than others.
2. Compare the costs of various sales representatives, similarly.
3. Investigate advertising costs in the light of sales pulling power.
4. Look into the channels of distribution—perhaps another type would do the job as well.
5. Have a careful look at classes of customers. Cutting out unprofitable customers can substantially reduce costs.
6. Examine the cost of small orders, which can incur selling expenses in too high a proportion.

There are a number of additional items in this particular check list which space does not permit examining in detail. The section on office costs has been omitted entirely. In that connection it is suggested that the best start in approaching cost reduction in the office might be to ask two basic questions:

1) What office work *actually* is needed to make a profit for the company and meet legal requirements for filing of forms and reports?
2) How many people and machines are needed to do this work?

In concluding, I will briefly review the fundamental aspects of cost-reduction.

CONCLUSION

No organization is too small or large to rule out the possibilities of savings through cost reduction. Opportunities exist everywhere. No concern can afford to ignore cost reduction; its competitor will not do so.

Cost reduction is a state of mind and should be constantly promoted as such.

Costs are not reduced merely by criticizing people. Often there is too much talk about cost reduction and too little planning and concentrated effort.

The importance of appointing capable men for the work, having the necessary time, cannot be too strongly emphasized. It is impractical to utilize people already overburdened with their everyday problems.

It should be a continuing program, for cost reduction can never be considered "completed."

For further reading

THE REAL MEANING OF COST REDUCTION, By Don G. Mitchell, AMA General Management Series No. 187. 1957.

HELPS FOR YOUR COST REDUCTION PROGRAM, By Benjamin P. Hamilton, N.A.A. Bulletin, Jan. 1959.

COST REDUCTION AIMED AT PRIME COSTS, By Chester A. Lakefield, N.A.A. Bulletin, Nov. 1957.

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AN APPROACH TO INVENTORY CONTROL

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The procedures described below for handling inventory accounting on electronic computers provide information useful in many ways. Among other advantages, they can: help attain efficient inventory turnover and reduce inventory investment; locate stock more efficiently and speed up inventory operations; reduce storage and handling costs and obsolescence; improve purchasing and aid in forecasting demand; while all the while showing up overall trends.

THE FOLLOWING APPLICATIONS are contingent on the use of an electronic computer as a supplement to inventory control.

Each application performs a useful function in inventory management and is practical for computer programming because of the large volume of data which must be processed and also because of the high degree of accuracy in the data which are used.

RATE OF CONSUMPTION

Shipments of individual stock items tend to vary from month to month due to seasonal and other factors. Thus the monthly figures on shipments need refinement and adjustment before they are useful. The fluctuations need to be ironed out.

The rate of consumption must be known as accurately as possible because the information is basic and has many uses. The rate of consumption, or the rate of monthly issues can be used to determine purchase budgets, set maximum and minimum inventory limits, indicate the trend of issues and forecast future stock levels months ahead.

There are several ways in which the rate of consumption can be determined. The simplest and most practical method is to use a 12-month moving average. This is a straight arithmetic average of the issues in the 12 most recent months. Then, as the figures are available for the current month, they are added and the first month's figures are subtracted. Thus the average always includes the last 12 months.

Stated in model form this procedure is as follows:

Where:

$x_1 x_2 x_3 \ldots x_n$ = the monthly issues in a period of months

$_n$ = Number of months

Then:

$x_1 + x_2 + x_3 \ldots + x_n = X_1$ Average monthly issues in 1st 12-month period

$x_2 + x_3 + x_4 \ldots + x_n + 1 = X_2$ Average monthly issues in 2nd 12-month period

And:

$X_1 X_2 = Q_1 Q_2$ The rate of consumption

The author is a graduate of the University of Pennsylvania. He has been active in the accounting profession nearly all of his adult life. Formerly a management consultant in the North Centre Ohio area, he is now serving with the government as a management analyst specializing in EDPE problems.

TREND OF ISSUES

If the current rate of consumption is compared with a base period, an index of the trend of the issues can be obtained.

Where:

Q_1 = Average monthly issues in the base period.

Q_2 = Average monthly issues in the most recent 12-month period.

Then:

$\frac{Q_1}{Q_2}$ = Percentage of increase or decrease which = r

And When:

r is less than 100 there is an uptrend

r is more than 100 there is a downtrend

The value of r can be used to estimate the rate of consumption months ahead, and by applying major program factors, the forecast can be adjusted to reflect the changes in the programs.

There are other methods for determining the trend of issues or the rate of consumption but this method is the most simple and is therefore recommended.

CALCULATED INVENTORY LEVEL

Calculated inventory level is the amount of inventory which should be on hand to prevent running out of stock. It is not less than one month's issues at the current rate of demand nor more than three months' issues regardless of the procurement lead time.

The calculated inventory level varies with:

—the rate of issues or consumption

—procurement lead time

—safety factor (predetermined)

—trend of the issues, increase or decrease

Where:

Q=Average monthly issues

L=Procurement lead time—months

a=Safety factor

r=Trend of the issues

Then the Calculated Inventory Level is:

$$arQ\frac{L}{L+1} = I_C$$

Example:

(1) $a = 3;\quad r = 1.02;\quad Q = 100;\quad L = 3$

$I_C = 3\ (1.02)\quad (100)¾ = 229$

(2) $a = 3;\quad r = 1.05;\quad Q = 100;\quad L = 15$ days

$$I_C = 3\ (1.05)\quad (100)\ \frac{.5}{1.5} = 105$$

EXCESS OR DEFICIT INVENTORY

The difference between the "Actual Inventory" and the "Calculated Inventory" normally represents the Excess or Deficit Inventory.

Thus where:

I_a = Actual Inventory

I_c = Calculated Inventory

Then:

$I_a - I_c = I_e \pm$ Excess/Deficit Inventory

And when:

I_e is more than 100 there is an excess inventory

I_e is less than 100 there is a deficit inventory

Some stock items, however, are subject to rapid turnover and the purchasing of these items is based on The Economical Order formula. This formula has the effect of providing for some stockpiling in the interests of economy. Thus, at the time one of these fast moving items is received, the inventory may be temporarily increased by planned stockpiling, and the excess inventory in such cases would have to be reduced by the amount of the stockpiling. This is accomplished as follows:

Where:

A = Number of orders which may be issued in one year based on the price of the item, the interest rate, purchasing and handling costs and the rate of issues each month.

Q = Average monthly issues

Then:

$\frac{12Q}{A} = I_s$ Stockpile Inventory based on Economical Order Quantities*

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*The formula for Economical Number of Orders is:

$$A = \sqrt{\frac{p\ Q\ i}{C}}$$

Where: A = number of orders; p = price;
Q = quantity; i = interest rate;
C = purchasing and handling costs

We can now restate the Excess Inventory formula:

$I_a - I_c - I_s = I_e$ Excess Inventory

Before computing the Excess Inventory the following test is made:

If I_a is less than I_c there is a Deficit Inventory and when there is a deficit inventory the Stockpile Adjustment of the Excess Inventory need not be made.

REORDER POINT INVENTORY

This is the amount of inventory which should be on hand, or due in, during the period between the placing of a purchase order and its receipt.

Where:

L = Procurement lead time

Q = Average monthly issues at the current rate of demand.

D = Quantity due in

Then:

$LQ = I_r$ Recorder Point Inventory

TEST 1

When the Calculated Inventory is less than the Reorder Point Inventory there is danger of running out of stock and Test 2 should be applied.

TEST 2

When the Actual Inventory is less than the Reorder Point Inventory Test 3 should be applied.

TEST 3

When the Actual Inventory, plus the due-ins, is less than the Reorder Point Inventory it is certain that stock will run out unless positive action is taken promptly. This condition therefore requires a "print-out" of the data in respect to the item so that the Materials Manager can take action.

These procedures provide the Materials Manager with information which can be put to practical use. They make it possible for him to manage the inventory so that a higher rate of turnover can be obtained and the investment in inventory can accordingly be reduced. They also eliminate much of the danger of running out of stock.

The methods outlined involve simple arithmetic and accordingly can be applied to a few items manually by anyone interested in making a test. However, to apply them to the thousands of items stocked by any large corporation, and to go through the steps each time a shipment is received or an issue is made, the capabilities of a computer are required.

INVENTORY ACTIVITY

One of the problems of managing a large inventory of supplies is to obtain a satisfactory rate of turnover. If the rate of turnover is low it is possible that the quantity on hand represents an unnecessary investment of capital. On the other hand, if the rate of turnover is high it does not follow that the goal of satisfactory turnover has been reached. The costs of frequent purchasing, receiving, inspecting and handling may offset the savings that are possible when the investment is low and the turnover is high. Thus while a high rate of turnover is generally good, it can be too good. However, if it drops to zero, or almost nothing, it is almost certain that the costs of obsolescence will soon be faced, and failure to recognize this fact only adds to the costs.

METHOD OF COMPUTING ITEM ACTIVITY

The following procedures show how this information can be obtained as a subroutine of a modern automatic data processing program for inventory accounting. Accurate records of the number of transactions, individual item balances and actual inventory issues are essential to the success of these procedures.

1. Obtain the quantity of the item which was issued during a period of months. This period may vary, but it should be for at least the twelve previous months if the figures are available.
2. Divide the total issues by the number of months in the period to obtain the average monthly issues.
3. Divide the total number of issue transactions in the period by the number of months to obtain the average number of issue transactions per month.
4. Multiply the Average Monthly Issues by the Average Monthly Issue Trans-

actions and divide the product by the Inventory Balance on hand at the end of the month.

5. The Quotient is the Index of Activity of the particular stock item.

6. Perform the same computations for every item in the inventory, class by class.

7. Tabulate the results and list the stock numbers in ascending order of activity within the price categories.

The above method stated algebraically is:

$$A = \frac{QT}{n^2B}$$

Where:

A=Inventory Activity Index
Q=Quantity of Issues in period
T=Number of transactions in the period
n=Number of months in period
B=Balance of Inventory at the end of the month

TURNOVER BASED ON DOLLAR VALUES

This type of index is one that has been used in business for many years. It still has its uses, particularly in providing a reference which serves to check the quantity and transaction index.

Since it uses the same data, this index can be computed quickly as follows:

1. Multiply the total issues during the period by the price of the item.
2. Multiply the balance of inventory on hand by the price.
3. Divide the value of the issues by the value of the inventory to obtain the inventory turnover rate on the basis of dollars.

Stated as a formula:

$$A' = \frac{p^Q}{p^B}$$

Where:

p=Price of the item
Q=Issues during the period
B=End of month balance
A=Inventory turnover rate based on dollar values

ECONOMICAL NUMBER OF ORDERS

This information can be incorporated in the tabulation along with the other indexes.

Since slow moving and dead stock items are not likely to be purchased, this routine would only be used when the activity indexes were above some predetermined level.

If the Materials Manager has a guide to the number of times purchases should be made, and knows the relative activity of the item, the information can be very useful. Since we already have most of the data needed for this routine in the machine it is almost a by-product.

The additional information required for this routine is:

1) the rate of interest which represents the cost of the investment in the inventory
2) the cost of executing a single purchase order
3) the cost of receiving, inspecting and handling a single shipment.

All other data are in the machine.

The method of computation is as follows:

1. Multiply the annual requirement (issues) by the standard price of the item to get the total value of the issues.
2. Multiply the value of the issues by the interest rate.
3. Divide the product of (2) by the cost of executing a single purchase order, including the cost of receiving, inspecting and handling.
4. Take the square root of the quotient to obtain the number of orders which can be placed economically in one year.

The model of this method is as follows:

Where:

A" = Economical number of orders
p = Price of the item (standard)
i = Rate of interest
C = Costs—purchasing and handling
Q = Quantity of issues in a year.

$$A'' = \frac{pQi}{C}$$

Substituting \$4.98 for p; 1200 for Q; 3.5% for i and \$20 for C we have:

$$A'' = \frac{(4.09)\quad (1200)\quad (.035)}{20}$$

$$= 3.23 \quad = 3 \text{ orders}$$

CONCLUSION

In summing up, the information obtained from these routines, which are essentially a by-product of other procedures, is useful in the following ways:

1) Help to attain an efficient inventory turnover.
2) Reduce inventory investment.
3) Aid in forecasting demand.
4) Locate stock more efficiently.
5) Speed-up inventory operations.
6) Flag inactive and dead stock.
7) Reduce storage and handling costs.
8) Reduce obsolescence.
9) Improve purchasing.
10) Increase inventory control.
11) Classify the inventory into activity groups.
12) Show various trends toward better or worse.

For further reading

COMPUTING PROTECTIVE STOCK BY STATISTICAL METHODS, By Vernon A. Rutherford, N.A.A. Bulletin, Jan. 1958.

Books in Review . . .

QUEUES, INVENTORIES AND MAINTENANCE

By Philip M. Morse, John Wiley & Sons, Inc., New York, 1958. pp. 202. $6.50.

Reviewed by: Patrick J. Robinson and Dr. George P. Henderson.

This book is the first in a series sponsored by the Operations Research Society of America. The second in the series *Finite Queuing Tables* (Leslie G. Peck and Nicholas Hazelwood, Wiley, New York) has been received and is intended as a companion volume of additional technical tables and illustrations of more compact operations. A third related volume is also in prospect to provide further tables and solutions for maintenance problems. These books are quite technical and potentially very valuable. The first deals with "the analysis of operational systems with variable demand and supply."

This is a disarmingly simple description of the first volume's scope. So is the author's prefatory comment that "its purpose is primarily expository, ... so that the newcomer to the field can begin to find his way around, can start to solve his own problems." From the point of view of a mathematician or skilled Operational Researcher this may be a fair statement—but the lay reader will need only a glance at its contents to appreciate just how difficult the subject can become even in an introductory treatment.

On close examination, it is evident the book gives a lucid introduction to the mathematical theory and practical solution of general queuing problems. The first five chapters deal with the solution of the steady state difference equations for a single channel queue, with exponential, Eriang and hyper-exponential arrival and service-times. Chapter 6 contains a short discussion of the transient behaviour of finite queues with Poisson arrivals and exponential service-times. Infinite queues are considered in Chapters 7 and 8 and the effects of various kinds of queue disciplines and priorities are examined in Chapter 9. Some "elementary" problems in inventory control and maintenance of equipment are analyzed in Chapters 10 and 11.

The eleven chapters are followed by a Glossary of Symbols used, Definitions and Properties of Functions Tabulated, Seven Tables, a Bibliography and Index.

To sum up: deep water, but smooth sailing—with the proper equipment. Dr. Morse has done his usual highly competent best to deal with a difficult subject unequivocally and concisely.

CORPORATE RECORDS RETENTION: VOLUME 1

Published by Controllership Foundation, Inc., New York, N.Y. pp. 242. $10.00.

Published as the first in a series of three guides to governmental requirements for retention of records, this volume reports on requirements of the United States Govern-

ment and its administrative agencies. Though not an exhaustive compilation of all statutes and regulations, this book provides a handy guide to management on U.S. Federal requirements under the general listings of Taxation, Labour and Securities followed by references to laws dealing with particular types of industries. Volume 2 in the series will contain similar information with reference to the Government of the Dominion of Canada and its Provinces.

INTERFIRM COMPARISON FOR MANAGEMENT

By Herbert Ingham & L. Taylor Harrington, British Institute of Management, published by The Millbrook Press Ltd., Southampton, pp. 70. 17s 12d Postpaid.

Reviewed by C. B. Taylor, C.P.A., R.I.A.

This small volume has a useful place in the growing library of reference material in the field of financial and operating ratio analysis. The theme is developed in a thoroughly non-technical fashion and, in consequence, should be appreciated by all at management level for the practical approach taken by the authors.

Of particular interest are six examples of the practical use of such ratios in the fields of engineering industry, light electrical manufacturing, iron foundries and retail trade.

Brief reference is also made to the main considerations in developing such programs dealing with the confidential aspects of the work, the comparability of the data developed, some references to the cost of developing the data and to how such programs are begun.

To those interested in this field and to indicate the extent of such programs, the four appendices constitute a valuable compendium. There appears a 22-page listing of such programs conducted in various European countries and the U.S.A., classified by trade. An example of the questionnaire or data sheet used in the British furniture industry is of interest. The productivity comparison used in assembling and fabricating industries as developed by the U.S.A. Department of Labor Statistics is included. Finally, a list of 23 added references is provided.

BRITISH BUSINESS MACHINE COMPANIES TO MERGE

Mr. Paul Pratt, Manager, Underwood Samas Punched Card Division announces that plans are formed for The British Tabulating Machine Company Limited to merge with Powers-SAMAS Accounting Machines Limited, with the former company having controlling interest. It is expected that the merger will be ratified by the Shareholders early in the new year.

The combined products of the merged companies will offer a most comprehensive range of punched card accounting machines with card capacities of 21, 40, 80 and 160 columns, with high speed and large capacity machines for data processing. In addition electronic calculators and computers are in the line.

Underwood Limited, with their SAMAS Punched Card Division, have a long term agency contract with Powers-SAMAS Accounting Machines Limited. They are now marketing the smaller capacity, low cost punched card accounting machines to business and industry with branches already established in Toronto, Montreal and Hamilton.